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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,433	05/02/2005	Richard Michael Jenkins	124-1114	6067

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EXAMINER	
RAHLL, JERRY T	
ART UNIT	**PAPER NUMBER**
2874	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/26/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/533,433	JENKINS ET AL.
	Examiner	Art Unit
	Jerry T. Rahll	2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12 and 13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12 and 13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 May 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date *11/30/06*.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,428,698 to Jenkins et al. in view of US Patent No. 7,042,631 to Smith et al.

5. Regarding Claim 1, Jenkins et a al. describes a hollow core MMI device including two multimode waveguides (20, 24) coupled to multiple fundamental mode waveguides (18, 22, 28) and a means (36) for varying phase in the fundamental mode waveguides (see Figures 1-2 and 10 and Columns 4-6 and 14). Jenkins et al. does not describe a means for linearly translating both

side walls of the fundamental mode waveguide without substantial distortion. Smith et al. describes means for phase-shifting a hollow waveguide by varying a cross-sectional dimension of the waveguide via compression (see Column 42 Lines 23-29). Compression of the waveguide necessitates linear translation of the sidewalls relative to one another. While Smith does not specifically describe the compression as being "without substantial distortion", the Examiner first notes any translation of a seawall is a "distortion" of the waveguide in some manner. Therefore, the substantial distortion referred to in the claim language must refer to some other form of distortion (e.g. twisting). Because Smith et al. does not describe any other form of distortion nor does the described compression inherently create distortion, Smith et al. describes means for linearly translating the sidewalls of the waveguides without substantial distortion. At the time of invention, it would have been obvious to one of ordinary skill in the art to use the phase shifting means of Smith et al. with the MMI device of Jenkins et al. The motivation for doing so would have been reduce losses from optical signals entering the phase shifting means.

6. Regarding Claim 2, Jenkins et al. describe the waveguides having a square cross-section.

7. Regarding Claim 3, Jenkins et al. does not specifically describe the internal surfaces of the hollow core waveguides coated with a layer of reflective material. However, such coatings in hollow-core waveguides are well-known in the art. At the time of invention, it would have been obvious to one of ordinary skill in the art to use such a coating with the combined Jenkins et al. and Smith et al. device. The motivation for doing so would have been to reduce attenuation of the waveguides (see Jenkins et al. at Column 9 Lines 10-15).

8. Regarding Claim 4, Jenkins et al. describes the device formed in a semiconductor material (see Column 4).

9. Regarding Claim 5, Jenkins et al. does not specifically describe the device formed in silicon. However, the formation of MMI devices in silicon is well-known in the art. At the time of invention, it would have been obvious to form the combined Jenkins et al. and Smith et al. device of silicon. The motivation for doing so would have been to utilize common and efficient manufacturing methods. Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

10. Regarding Claim 6, Smith et al. does not specifically describe means for varying the cross-sectional dimension of the waveguide as a MEMS actuation means. Smith et al. describes the means as a piezo electric transducer (see Column 42 Lines 24-25). However, piezo electric transducers are commonly formed as MEMS actuators. At the time of invention, it would have been obvious to form cross-section varying means of Jenkins et al. and Smith et al. as a MEMS actuator. The motivation for doing so would have been to utilize common and efficient manufacturing methods.

11. Regarding Claim 7, Jenkins et al. describes the MMI device used in a routing device (See Column 8 Lines 6-10).

12. Regarding Claim 8, Smith et al. describes the means for varying the cross-section dimensions of the waveguide arranged such that the fundamental mode is varied by application of an external force (see Column 42 Lines 3-30).

13. Regarding Claim 9, Jenkins et al. describes an optical router including at least one fundamental mode input waveguide (18) coupled to an MMI beam splitter (20), the MMI beam splitter coupled via multiple relay waveguides (22) to an MMI beam combiner (24) having

multiple fundamental mode output waveguides (28), where the relay waveguides include a means for altering the relative phases (36) between the beams propagating through the relay waveguides such that radiation from the fundamental input waveguide us selectably routed to any of the output waveguides (see Figures 1-2 and Columns 4-6). Jenkins et al. does not describe the means for altering the relative phases as a means for varying the cross-sectional dimensions of a portion of the fundamental waveguides. Smith et al. describes means for phase-shifting a hollow waveguide by varying a cross-sectional dimension of the waveguide via compression (see Column 42 Lines 23-29). Compression of the waveguide necessitates linear translation of the sidewalls relative to one another. While Smith does not specifically describe the compression as being "without substantial distortion", the Examiner first notes any translation of a seawall is a "distortion" of the waveguide in some manner. Therefore, the substantial distortion referred to in the claim language must refer to some other form of distortion (e.g. twisting). Because Smith et al. does not describe any other form of distortion nor does the described compression inherently create distortion, Smith et al. describes means for linearly translating the sidewalls of the waveguides without substantial distortion. At the time of invention, it would have been obvious to one of ordinary skill in the art to use the phase shifting means of Smith et al. with the MMI device of Jenkins et al. The motivation for doing so would have been reduce losses from optical signals entering the phase shifting means.

14. Regarding Claim 10, Jenkins et al. describes an optical router including a plurality of input/output fundamental mode waveguides (202) and a plurality of relay waveguides (206), where the router is configured to receive a beam from one of the input/output waveguides and divide the received beam into a plurality of beams, via modal dispersion in a multimode

waveguide region (204), into a plurality of beams coupled to the relay waveguides, where the relay waveguides include a means for altering the relative phases (36) between the beams propagating through the relay waveguides and each relay waveguide is terminated with a reflective means (208) such that radiation is returned to the multimode waveguide region and routed to one of the input/output waveguides (see Figure 10 and Columns 14). Jenkins et al. does not describe the means for altering the relative phases as a means for varying the cross-sectional dimensions of a portion of the fundamental waveguides. Smith et al. describes means for phase-shifting a hollow waveguide by varying a cross-sectional dimension of the waveguide via compression (see Column 42 Lines 23-29). Compression of the waveguide necessitates linear translation of the sidewalls relative to one another. While Smith does not specifically describe the compression as being "without substantial distortion", the Examiner first notes any translation of a seawall is a "distortion" of the waveguide in some manner. Therefore, the substantial distortion referred to in the claim language must refer to some other form of distortion (e.g. twisting). Because Smith et al. does not describe any other form of distortion nor does the described compression inherently create distortion, Smith et al. describes means for linearly translating the sidewalls of the waveguides without substantial distortion. At the time of invention, it would have been obvious to one of ordinary skill in the art to use the phase shifting means of Smith et al. with the MMI device of Jenkins et al. The motivation for doing so would have been reduce losses from optical signals entering the phase shifting means.

15. Regarding Claim 12, Jenkins et al. describes a beam splitter including a multimode waveguide (20), a fundamental mode input waveguide (18) coupled tone end of the MMI waveguide, and N fundamental modes output waveguides (22) optically coupled to the other end

of the MMI waveguide such that the lateral positions of the input and output waveguides and the length of the MMI are such that radiation input of the input waveguide is divided to N portions by modal dispersion and intermodal interference with each portion coupled to a respective output waveguide, and where the output waveguides include a means for altering the relative phases (36) between the beams propagating through the relay waveguides such that radiation from the fundamental input waveguide us selectably routed to any of the output waveguides (see Figures 1-2 and Columns 4-6). Jenkins et al. does not describe the means for altering the relative phases as a means for varying the cross-sectional dimensions of a portion of the fundamental waveguides. Smith et al. describes means for phase-shifting a hollow waveguide by varying a cross-sectional dimension of the waveguide via compression (see Column 42 Lines 23-29). At the time of invention, it would have been obvious to one of ordinary skill in the art to use the phase shifting means of Smith et al. with the MMI device of Jenkins et al. The motivation for doing so would have been reduce losses from optical signals entering the phase shifting means.

16. Regarding Claim 13, Jenkins et al. describes a beam combiner including a multimode waveguide (204), N fundamental mode input waveguide (206) coupled tone end of the MMI waveguide, and a fundamental mode output waveguide (202) optically coupled to the other end of the MMI waveguide such that the lateral positions of the input and output waveguides and the length of the MMI are such that radiation input of the input waveguides is combined by modal dispersion and intermodal interference in the MMI waveguide and coupled to the output waveguide (202), and where the input waveguides include a means for altering the relative phases (210) between the beams propagating through the relay waveguides such that radiation from the fundamental input waveguide us selectably routed to any of the output waveguides (see

Figures 10 and Column 14). Jenkins et al. does not describe the means for altering the relative phases as a means for varying the cross-sectional dimensions of a portion of the fundamental waveguides. Smith et al. describes means for phase-shifting a hollow waveguide by varying a cross-sectional dimension of the waveguide via compression (see Column 42 Lines 23-29). At the time of invention, it would have been obvious to one of ordinary skill in the art to use the phase shifting means of Smith et al. with the MMI device of Jenkins et al. The motivation for doing so would have been reduce losses from optical signals entering the phase shifting means.

Response to Arguments

17. Applicant's arguments, see Remarks, filed 30 November 2006, been fully considered.

18. Regarding Applicant's claim of priority, the Examiner agrees that the Applicant has a proper claim to priority and apologizes for not acknowledging the proper claim in the previously mailed Office Action.

19. Regarding Applicant's arguments regarding the new limitations added to claims 1, 9, and 10, the Examiner directs the Applicant's attention to paragraphs 5, 13, and 14, above, discussing the Smith et al. reference relating to the new claims limitations.

20. Regarding Applicant's arguments regarding the motivation to combine the Jenkins et al. and Smith et al. prior art teachings, the Examiner notes that Smith et al. teaches electrooptic phase shifting and waveguide compression as art-recognized equivalents for shifting phase in optical waveguides. As such, substituting one means for phase shifting for another is obvious to one of ordinary skill in the art.

21. Regarding Applicant's arguments regarding the newly added claims 12 and 13, the Examiner directs the Applicant's attention to paragraphs 15 and 16, above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry T. Rahll whose telephone number is (571) 272-2356. The examiner can normally be reached on M-F (9:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Michelle R. Connelly Cushwa
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PRIMARY EXAMINER
2/20/07